PB-218 640

EVALUATION OF THE LANDRUM RETROFIT SYSTEM

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Environmental Protection Agency
Ann Arbor, Michigan

April 1972

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72-22

APTD-1406
PB 218 640

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Springfield VA 22151

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BIBLIOGRAPHIC DATA SHEET	1. Report No. APTD-1406	2.	3. Recipient's Accession No. PB 218 640
4. Title and Subtitle: Evaluation of the Landrum Retrofit System			5. Report Date: April 1972 6.
7. Author(s): Henry L. Gompf			8. Performing Organization Rept. No.
9. Performing Organization Name and Address: ENVIRONMENTAL PROTECTION AGENCY Test and Evaluation Branch Ann Arbor, Michigan			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address: Same			13. Type of Report & Period Covered: Inhouse 14.

15. Supplementary Notes

16. Abstracts

A confirmatory evaluation was conducted on a retrofit system for which previous test data indicated a significant reduction in hydrocarbon and carbon monoxide emissions. The Landrum system employs the replacement of stock idle mixture screws with hollow bleed-type screws which allow gasoline to enter mixing with air. For this test the stock idle screws were removed from a 1971 Ford, 351 CID engine with automatic transmission. The Landrum screws were installed with the associated heating element. Testing of the vehicle both baseline and device equipped was done in accordance with the 1972 and 1975 Federal Test Procedures. Fuel consumption has been calculated from exhaust emissions. The test data indicates that the Landrum system appears to reduce hydrocarbon by 10% and carbon monoxide by 15%. A 7% fuel consumption penalty is associated with the system. While these reductions appear small, this was partially due to careful adjustment of the baseline vehicle to a lean idle setting.

17. Key Words and Document Analysis. 17a. Descriptors

Air pollution
Exhaust emissions
Vehicles
Air pollution control equipment
Tests
Standards
Hydrocarbons
Carbon monoxide
Fuel consumption

17b. Identifiers/Open-Ended Terms

Retrofit devices
Landrum Retrofit System
Federal Test Procedure (1972)
Federal Test Procedure (1975)

17c. COSATI Field/Group 13B I

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited	UNCLASSIFIED	6
	20. Security Class (This Page) UNCLASSIFIED	22. Price 3.00

Background

Mr. Porter Landrum of Birmingham, Alabama, supplied the Test and Evaluation Branch with test data indicating significant reduction in hydrocarbon and carbon monoxide on a vehicle equipped with his retrofit system. Based on this preliminary testing, a confirmatory evaluation was conducted in the EPA laboratory at Ann Arbor.

Device Tested

The Landrum system employs the replacement of stock idle mixture screws with hollow bleed-type screws. These screws are tranversely drilled near the ends to allow gasoline to enter mixing with air. The air supplied to the screws is preheated by means of a vacuum actuated cylindrical resistance heater. For this test the stock idle screws were removed from a 1971 Ford, 351 CID engine with automatic transmission. Mr. Landrum's screws were installed with the associated heating element. No idle mixture adjustment was necessary as the Landrum screws are seated solidly in the carburetor.

Test Program

Testing of the vehicle, both baseline and device equipped was done in accordance with the November 10, 1970, and July 2, 1971, Federal Register. These documents describe the 1972 and 1975 Federal Test Procedures, respectively. In addition, fuel consumption has been calculated from the exhaust emissions for each test.

Test Results

The test data is presented in the Appendix of this report. As indicated the Landrum system appears to reduce hydrocarbon by 10% and carbon monoxide by 15%. A 7% fuel consumption penalty is associated with the system. It should be noted that the baseline vehicle, in this case, was set at a lean idle of .25% CO. This was roughly the same idle CO level as obtained with the Landrum device installed.

Conclusions

While the reductions obtained appear small, this was partially due to careful adjustment of the baseline vehicle to a lean idle setting. The setting for the Landrum system required merely the seating of the special idle screws. No doubt the effective reduction of carbon monoxide would have been appreciably higher if the test vehicle had been adjusted to normal maintenance levels of carbon monoxide.

Due to the use of small passages in the idle screw concern is expressed over deposit plugging. This tendency could result in rough idle, stalling, or misfire. Durability testing would be required to quantitatively evaluate this condition.

APPENDIX

1975 Federal Emission Test
All Emission Results in Grams Per Mile

Date	HC	CO	CO_2	NOx	Fuel MPG
Baseline					
4-17-72	2.81	13.9	644.1	5.35	12.9
4-18-72	2.44	11.0	651.4	5.42	12.9
Average	2.63	12.5	647.8	5.39	12.9
Landrum System					
4-4-72	2.46	12.0	690.4	6.10	12.0
4-5-72	2.28	11.0	732.3	5.05	11.5
4-6-72	2.42	10.2	724.9	5.23	11.6
4-7-72	2.29	9.3	690.7	5.27	12.4
Average	2.36	10.6	709.6	5.41	11.9
% Reduction from Baseline	10%	15%	10% increase	0%	7% penalty

1972 Federal Emission Test
All Results in Grams Per Mile

Date	HC	CO	CO_2	NOx
Baseline				
4-17-72	3.25	24.4	677.9	5.37
4-18-72	2.68	19.2	678.7	5.27
Average	2.97	21.8	678.3	5.32
Landrum System				
4-4-72	2.96	21.0	720.0	6.13
4-5-72	2.61	19.8	760.0	4.97
4-6-72	2.61	16.6	776.9	5.10
4-7-72	2.51	15.9	710.1	5.12
Average	2.67	18.3	741.8	5.33
% Reduction from Baseline	10%	16%	9% increase	0%